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Factsheet
TERRE, MARI and PICASSO – European balancing platforms

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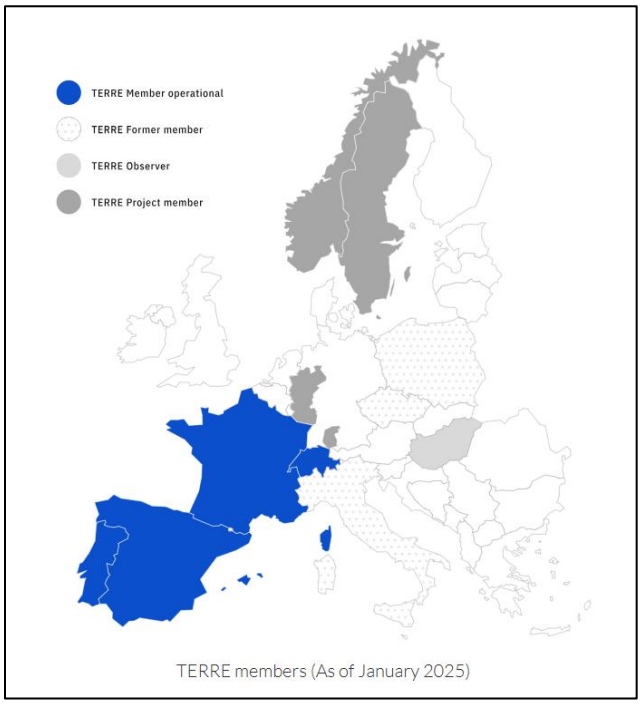
1 Initial situation

In 2017, the European Union (EU) adopted the Electricity Balancing Guideline (EB GL) to harmonise control reserves in Europe. The aim of the EB GL was to establish a pan-European market for control reserves with a uniform market design and free trading of control reserves without barriers to enable transmission system operators (TSOs) to procure control reserves more efficiently, reliably, and cost-effectively. According to the EB GL, the harmonisation of control reserves should include the introduction of a transnational European market for control energy. This was put into practice with the TERRE, MARI, and PICASSO implementation projects. The general objective is to increase security of supply, limit emissions, and reduce costs.

Go-live of TERRE in October 2020

In autumn 2014, Swissgrid established the «Trans European Replacement Reserve Exchange» (TERRE) cooperation together with other members of the European Network of Transmission System Operators for Electricity (ENTSO-E) to create a common market for slow tertiary control energy (activation time of 30 minutes). The TERRE platform has been in operation since October 2020. Swissgrid has been an operational member of TERRE since 8 October 2020.



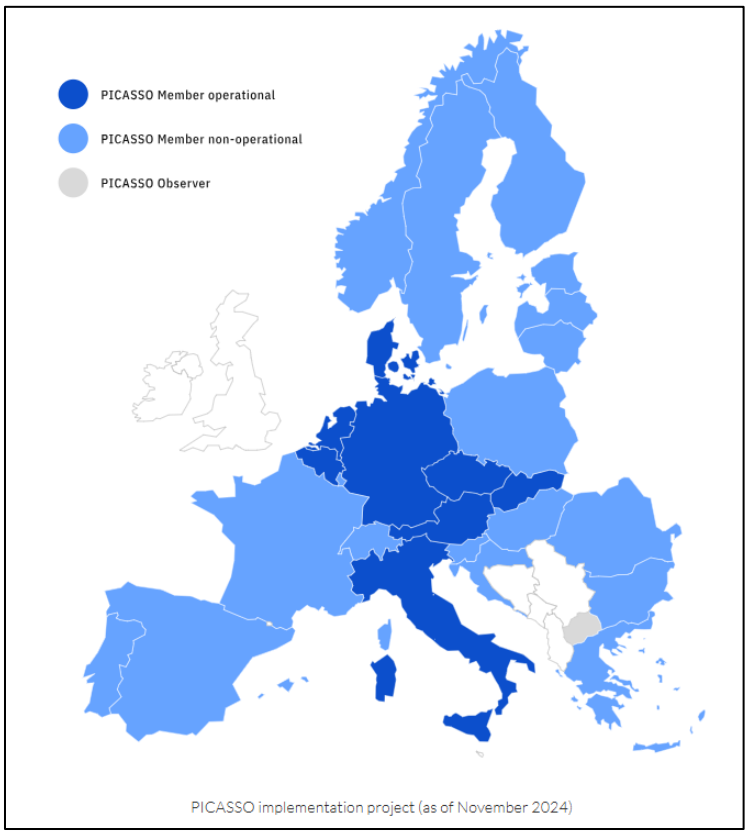
Source: ENTSO-E (TERRE)

Go-live of PICASSO in June 2022

In 2017, Swissgrid and other members of ENTSO-E together established the «Manually Activated Reserves Initiative» (MARI) and the «Platform for the International Coordination of Automated Frequency Restoration and Stable System Operation» (PICASSO). While PICASSO encompasses the tenders for secondary control energy (SCE; activation time of 5 minutes), «MARI» does the same for fast tertiary control energy (TCE; activation time of 12.5 minutes).

Swissgrid was the first participating transmission system operator to successfully complete all the operational tests for the PICASSO platform. In May 2022, the Steering Committee for the PICASSO project therefore confirmed Swissgrid's technical readiness to start operations. At the same time, however, the go-live was postponed until further notice due to legal and political uncertainties surrounding the relationship between Switzerland and the EU.

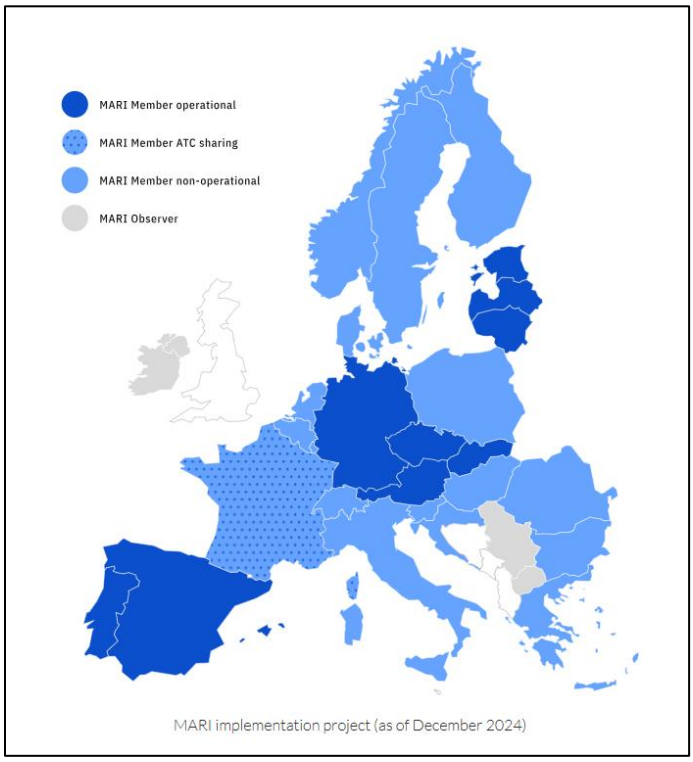
This means that although PICASSO has been in operation for the Swiss market since 1 June 2022, a connection has not yet been established with the central PICASSO platform. Consequently, no Swiss bids or requests are possible on the platform for the time being. However, the product properties of SCE in Switzerland were harmonised with those of PICASSO on 1 June 2022, meaning that compatibility is ensured at all times.



Source: ENTSO-E (PICASSO)

Go-live of MARI in October 2022

The MARI platform went live at the beginning of October 2022. In Switzerland, the TCE product properties were harmonised with those of MARI as early as the end of August 2022 to ensure compatibility for fast tertiary control energy as well. The decision as to if and when an exchange of control energy is possible with the MARI platform will be determined by the same uncertainties that PICASSO is subject to.



Source: ENTSO-E (Manually Activated Reserves Initiative)

The three common European platforms, MARI, PICASSO, and TERRE, have therefore been in operation since autumn 2022, contributing to the EU's goal of establishing a complete European single electricity market. Swissgrid is currently only an operational member of TERRE.

2 50 Hertz – the pulse of our grids

Transmission systems function as lifelines for security of supply, and their pulse (or frequency) is 50 Hertz.

Frequency is a physical measure of alternating current and is measured in Hertz (Hz). It indicates the number of times that the current oscillates per second. The standard frequency in the European interconnected grid is 50 Hz. The current changes direction 100 times a second, meaning it completes 50 cycles of oscillation per second. The permissible fluctuation is between 49.8 and 50.2 Hz. Within this range, major installations and small appliances operate without any issues.

The system frequency of 50 Hz remains stable only if the generation and consumption of electrical power are in balance. This means that generation must comply precisely with demand. As the Swiss transmission system operator, Swissgrid is tasked with ensuring secure, high-performance, and efficient grid operation. It is responsible for making sure that the system frequency remains within the permissible range.

3 What is control power, and what is it used for?

The levels of electricity generation and consumption in the grid depend on a variety of factors – such as the time of day, the air temperature, and the amount of sunshine. Swissgrid receives the relevant «schedules» for energy exchange within Switzerland and across borders from the energy suppliers (balance groups). In the grid control rooms in Aarau and Prilly, Swissgrid ensures 24/7 that the balance between

generation and consumption is maintained and that reserves are available at all times to compensate for frequency fluctuations and imbalances in the Swiss control area. These imbalances inevitably occur because planned electricity consumption never exactly matches actual consumption, and fluctuations can also occur on the generation side.

In addition to these normal schedule deviations, however, unplanned events can also occur that lead to a significant imbalance between generation and consumption and require a rapid response by the transmission system operators. For these kinds of cases, control power is also reserved to stabilise the grid immediately in the event of disturbances.

Control energy is the energy that a grid operator needs to balance unforeseen fluctuations in the grid. The grid frequency can fluctuate in both directions: if electricity consumption exceeds generation, positive control energy is needed. This means that either more electricity needs to be quickly fed into the grid, or electricity consumption needs to be reduced. Conversely, where supply is too high and demand for electricity is too low, negative control energy is used – electricity consumption is rapidly increased, or electricity generation needs to be reduced.

Transmission system operators have access to three control energy qualities:

- **Primary control energy**, which is accessed to rapidly stabilise the grid **within 30 seconds**, is automatically activated in the generator of the power plant. Across Europe, for example, hydropower plant and battery generators immediately respond to a frequency deviation and increase or reduce the supply of electricity. Primary control energy is used only for initial stabilisation and is replaced by secondary control energy as quickly as possible so that it is available for the next deployment.
- **Secondary control energy** must be available **within five minutes** (it is activated by the central load frequency controller at Swissgrid). It is typically provided by hydropower plants, which adjust electricity generation by releasing higher or lower volumes of water or increasing or reducing the power of their storage pumps.
- **Tertiary control energy** is the slowest form of control energy. It replaces **secondary control energy at the earliest a quarter of an hour after it is requested.** This is done manually (i.e. by the Specialists System Operation in Swissgrid's control centre).

The control energy market can be clearly explained by comparing it with adaptive cruise control in a vehicle. Adaptive cruise control detects a vehicle driving in front of you and automatically maintains the defined safety distance. If you are driving at 100 km/h, the safety distance should always be at least 50 metres. If your vehicle approaches the one in front of you, your vehicle automatically brakes. If the distance increases, it accelerates. This stop-and-go method ensures constant compliance with the minimum distance.

A similar concept applies to the system frequency. It should always be 50 Hz. To balance fluctuations, energy needs to be added or removed from the grid quickly as required (in a similar way to the acceleration and braking of adaptive cruise control).

Companies tender their flexible power on the control energy market on a daily or weekly basis. If a company's bid is successful, it is responsible for ensuring that its flexible installations can be switched on or off as necessary during the tendered time. Swissgrid pays a premium for this availability. In addition, a price per megawatt hour is paid for the actual ramp-up and shut-down of the installations.

4 How do balancing platforms work?

Specifically, the quarter-hourly MARI process proceeds as follows: the ancillary services providers (ASP) of every participating country send their transmission system operators the control energy tenders for the coming quarter of an hour. Every transmission system operator transfers these tenders, together with their control energy demand and the available cross-border capacity, to the common optimisation platform «Libra». Libra determines the most economic method of covering the control energy demand for the whole of Europe, considering the available cross-border capacities, and sends the results (covered control energy demand and selected control energy tenders) to the relevant transmission system operators. The transmission system operators then request the accepted tenders from their ASPs.

The PICASSO platform is based on the «International Grid Control Cooperation» (IGCC) functionality (netting of opposing demand for secondary control energy of TSOs). In addition to IGCC, the introduction of PICASSO means that the request for the remaining demand is also made jointly. This request is then made in the country within the PICASSO network with the most favourable tenders at that time. As with MARI, the available cross-border capacities are considered.

5 Benefits of TERRE, MARI, and PICASSO for Switzerland – higher system security and lower costs

Previously, secondary and tertiary control reserves were virtually exclusively the domain of national markets. With the Electricity Balancing Guideline (EB GL), the EU has established a binding regulation for the procurement of control energy in the EU that transforms the control energy market from a national to a pan-European matter. The aims are to achieve more efficient procurement, a more reliable provision of control energy, and lower costs for end consumers. Additionally, the EB GL is also preparing the European energy system for a future in which renewable energies will form the backbone of energy supply and consumers will play a more active role.

Swissgrid's participation in TERRE, MARI, and PICASSO will help increase system security, as more control energy is available than on a national market. It will also lead to lower costs for control energy. Furthermore, Swissgrid's participation will result in better integration in the European interconnected grid in the operationally critical phase before real-time operation.

6 Reasons for the threat of exclusion

As an electricity agreement with the EU has been negotiated but is not yet in force, Switzerland's participation in TERRE, MARI, and PICASSO is only possible, according to the EB GL, if the EU Commission agrees to it. As an alternative to an electricity agreement, Switzerland's participation is only possible if its exclusion could lead to unplanned physical power flows through Switzerland that would place the system security of the region at risk. This danger was confirmed in an «All TSO Opinion» (Dec. 2017) and by ACER (April 2018). Operational findings also support this analysis.

However, from the EU Commission's perspective, Swissgrid's participation breaches the Electricity Balancing Guideline (Art. 1.6 and 1.7 EB GL), as there has been no positive decision on this by the EU Commission and the preconditions for such a decision are not in place, despite the aforementioned «All TSO Opinion». The EU Commission argues that Swissgrid's participation in TERRE (and consequently in MARI and PICASSO) is not essential to ensure system security in the region. According to the EU Commission, Swissgrid and the European transmission system operators would already have adequate emergency measures at their disposal to take action in the event of disruptions.

The EU Commission is calling for Swissgrid to be excluded from the TERRE balancing platform. Swissgrid has appealed against this decision. In February 2025, the European Court of Justice (ECJ) ruled in favour of Swissgrid, authorising it to submit a complaint. Although the legal dispute is still ongoing, the judgement confirms that even companies from third countries have a right to be heard if they are sufficiently affected by a decision. In addition to the TERRE proceedings, Swissgrid is also defending itself against the exclusion from the MARI and PICASSO platforms and Imbalance Netting (IGCC). Swissgrid's aim is to fulfil its legal mandate – the secure operation of the transmission grid – as effectively as possible. An electricity agreement with the EU would make all these proceedings superfluous. It would create legal certainty and allow Swissgrid to participate and have a say in these balancing platforms, which are essential for grid stability in Switzerland and the region.

7 Consequences of exclusion

The Swiss extra-high-voltage grid is in the centre of the European interconnected grid. Close collaboration with partners in Europe is therefore extremely important for system security in Switzerland and in neighbouring European countries. If Swissgrid were excluded from the new European platforms for the joint requesting of control energy in the long term, this would lead to a further increase in unplanned load flows in the Swiss transmission grid.

As there are hardly any instruments left to take corrective action at such short notice, this would in turn jeopardise grid stability. In addition, the EU transmission system operators would not have access to flexible Swiss hydropower, which accounts for a key part of control energy, particularly in France.